



# NOAA Fleet Update

## October 2016

The following update provides the status of NOAA's fleet of ships and aircraft, which play a critical role in the collection of oceanographic, atmospheric, hydrographic, and fisheries data. NOAA's current fleet of 16 ships – the largest civilian research and survey fleet in the world – and nine aircraft, are operated, managed, and maintained by NOAA's Office of Marine and Aviation Operations ([OMAO](#)). OMAO includes civilians, mariners, and officers of the United States NOAA Commissioned Officer Corps ([NOAA Corps](#)), one of the nation's seven Uniformed Services.



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# OMAO and the NOAA Corps – In the News

## Hurricane Hunters

- ABC News

Some of the most important weather warnings come from hurricane hunters. [David Muir](#) spoke to Flight Director Jack Parrish, a National Oceanic and Atmospheric Administration (NOAA) meteorologist who has flown into the “eye” of many hurricanes.

## MPR News Reflections and observations on the news; Video: Flying into a hurricane

-Minnesota Public Radio

There are two amazing takeaways from this NOAA video of a “hurricane hunter” airplane flying into Hurricane Matthew. One is the amazing power and structure of a hurricane. The more amazing takeaway, however, is that there are people who walk among us who willingly fly into a hurricane...

## These hurricane hunters flew straight into the eye of Matthew

-Mashable

This stunning footage shows a crew of National Oceanic and Atmospheric Administration (NOAA) “hurricane hunters” as they fly through Hurricane Matthew’s eyewall and into the eye of the storm...Hurricane hunters have an important scientific role as they are able to record variables that are difficult for satellites in space to measure in detail. That includes hurricane wind speed, temperature, humidity, air pressure and rainfall. The information is key to issuing accurate hurricane warnings...

## Hurricane Matthew Carves New Inlet Along Florida Coast

-The Weather Channel

A combination of storm surge and large, battering waves from Hurricane Matthew altered a part of the northeast Florida coastline. Between St. Augustine and Palm Coast, a small new inlet was carved out by the powerful water pounding the coast. The new inlet can be seen in this before-and-after image. A NOAA aircraft taking aerial photography after the storm this weekend illustrated what the National Weather Service confirmed in an official survey...

## NBC2 boards Hurricane Hunter flight into tropical cyclone

-NBC 2 (Ft. Myers, FL)

NBC2 Meteorologist Kristen Kirchhaine joined the NOAA Hurricane Hunters on an 8-hour mission into Tropical Depression 9 -- now Tropical Storm Hermine. The NOAA Hurricane Hunters are a crew of men and women that are given a task like no other...They must make multiple passes through the system to attain the best data. That data has to come from within the storm. It's all in an effort to keep you safe. "If we know what the storm is doing now, hopefully, we can get a better prediction for all the people who are in harm's way," said Ian Sears, flight director. At times, the ride isn't so smooth. But, the well-trained and dedicated crew hardly notice. "We're about to fly into what has been the most convective corner," said the pilot. And this will probably get bumpy..."

## Ask the Captain: Why are hurricane hunters propeller-driven?

-WFMY (Greensboro, NC)

Question: Why are the hurricane hunter planes only twin turboprops and not the regular fan jets that passenger planes use? — Submitted by reader Edward Zell, Ohio. Answer: The turboprops are more tolerant of hail than the jets. Airplanes that penetrate thunderstorms have an increased chance of encountering hail. Additionally, the two types of airplanes used, the P-3 and the C-130, are especially rugged. Good question!

### [Tropical systems threaten Southeast US, Hawaii](#)

-CNN

As people make outdoor plans to enjoy the last unofficial week of summer and the Labor Day holiday, several tropical storm systems are threatening the southeastern US and the Hawaiian Islands. Several could make landfall -- or at least brush the coastline -- later this week, bringing heavy rains and possible flooding. With the statistical peak of hurricane season approaching in early September, storms are spinning off the Carolinas and in the Gulf of Mexico. The system called Tropical Depression Nine in the Gulf of Mexico is now Tropical Storm Hermine, the National Hurricane Center announced Wednesday afternoon, after a NOAA Hurricane Hunter aircraft measured winds of 40 mph with the storm...

### [NOAA Outlines Plans for Future Navigational Charts](#)

-Maritime Executive

The National Oceanic and Atmospheric Administration (NOAA) has outlined the future of its navigation efforts in testimony before the U.S. Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment... This summer, NOAA plans to acquire 275 square nautical miles (SNM) of Arctic hydrographic survey data in the Etolin Strait east of Nunivak Island and off the North Coast of Unalaska Island. In addition, the NOAA ship *Fairweather* will conduct a fisheries habitat survey in Bristol Bay to optimize data quality for habitat mapping; any usable hydrographic survey data that meets NOAA charting requirements will be applied to nautical charts...

### [NOAA researchers explain what it's like to fly into a hurricane](#)

-Popular Science

Many people have lived through hurricanes, but very few have flown into them on purpose. On a Reddit AMA (ask me anything) today, Frank Marks, the head of NOAA's Hurricane Forecast Improvement Project and Commander Justin Kibbey, a NOAA pilot, took questions about what it's like to fly into hurricanes to gather data crucial to helping forecasters predict a storm's movement...

### [South Prairie teacher heading to sea on shark survey](#)

-Tillamook Headlight Herald

Denise Harrington, a second-grade teacher at South Prairie Elementary in Tillamook, Ore., set sail on Sept. 17 to assist scientists on a 14-day survey of sharks in the Gulf of Mexico. This is not Harrington's first voyage at sea. Harrington is an alumna of NOAA's Teacher at Sea program, which bridges science and education through real-world research experiences. This year, she was selected for a second venture through a separate, alumni-only application process... Harrington will board NOAA Ship *Oregon II* in Galveston, Texas, and work side by side with scientists to conduct an ongoing survey of shark and red snapper populations in the southeastern United States...

### [Hurricane Matthew pushing across Caribbean as strong Cat 3 storm](#)

-Miami Herald

Hurricane Matthew, now a major Category 3 storm, continued to strengthen Friday afternoon with winds reaching 120 mph. The storm continues to push toward Jamaica, where the island will likely begin to feel the sprawling storm's fierce winds as early as Saturday. In their 2 p.m. update, National Hurricane Center forecasters said the storm was located 475 miles southeast of Kingston, heading west, southwest at 12 mph.... A hurricane hunter plane, nicknamed Gonzo and capable of flying high altitude missions, is scheduled to fly over the storm again this afternoon. The plane flies around and ahead of the storm to collect information about the atmosphere. In the past, it has improved forecast tracks by as much as 20 percent, Feltgen said. The U.S. Air Force also continues to fly into the storm every six hours to take measurements...



# FAA Safety Management System

## OMAO's Aircraft Operations Center Achieves Level 3

Federal Aviation Administration (FAA) Safety Management System (SMS) the formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of safety risk controls. It includes systematic procedures, practices, and policies for the management of safety risk. SMS is becoming a standard throughout the aviation industry worldwide. It is recognized by the Joint Planning and Development Office (JPDO), International Civil Aviation Organization (ICAO), and civil aviation authorities (CAA) and product/service providers as the next step in the evolution of safety in aviation. SMS is also becoming a standard for the management of safety beyond aviation.

In August, OMAO's Aircraft Operations Center (AOC) was inspected by an independent team to re-certify the SMS Level 2 registration. While AOC originally sought Level 3 registration, the command had recommended we only pursue Level 2 out of concern for over-burdening our workforce while preparing for the 2016 hurricane season and the impending relocation from MacDill AFB. The inspection's initial findings did not include any discrepancies. AOC engaged the inspectors to determine what AOC needed to improve to Level 3 before our next inspection in 2018. Level 3-the highest awarded-reflects "that an operator's SMS program is sustained and supported by an ongoing improvement process and a positive safety culture."

After extensive review, the SMS inspection team concluded that AOC meets the Level 3 standards. AOC now holds a Level 3 SMS registration as of September 26, 2017. This achievement reflects the dedication and excellence of AOC's employees and management.





# NOAA Corps Recruiting



Awarded "Dedicated to STEM Diversity" *Diversity in Action Magazine*

*Diversity in Action: Advancing STEM (DIA) Professionals and Students* informed NOAA Corps recruiting that the NOAA Corps has been selected by *DIA*'s readers as a 2016 "Dedicated to STEM Diversity" recipient in the government/defense category.

In May, *DIA* launched its first reader survey, allowing its readers to submit the names of companies, nonprofits, government and defense agencies, institutions of higher learning and individuals that they believe are advocates for diverse STEM professionals and students. They received feedback from their readers, and the list of survey results will be published in our November/December issue of *Diversity in Action*. The NOAA Corps was identified as a top nominee. *DIA* will share the stories from the top nominees dedicated to diversity and inclusion and how they are supporting the next generation of STEM professionals.







# NOAA Basic Officer Training (BOTC)



Class 128



The BOTC students just returned from a 16 day voyage aboard USCGC *Eagle*! A multitude of memories were made as the students bonded with their Coast Guard counterparts and many got their first taste of life at sea. The voyage began in the middle of Tropical Storm Hermine, making for particularly exciting experience with howling winds and heavy seas.

Photo: [NOAA]





# OMAO's Ships and Centers



OMAO's [Ship Tracker](#) (screen shot below) shows information about the location - present and past - of our fleet of research and survey ships. Please note: To access Ship Tracker you must create an account with a **.gov** or **.mil** email address. All other access is restricted.



OMAO's ships and related Marine Centers are listed below based on the geographical location of the vessels' homeports starting in the Northeast and ending in the Pacific.

## **New Castle, NH**

### **NOAA Ship *Ferdinand R. Hassler***

**Commanding Officer:** LCDR Matthew Jaskoski  
**Primary Mission Category:** Hydrographic Surveys  
**DEPART:** Charleston, South Carolina **ARRIVE:** Charleston, South Carolina  
**DEPART:** Charleston, South Carolina **ARRIVE:** Charleston, South Carolina

**Project:** Approaches to Wilmington

**Objective:** To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

## **Newport, RI**

### **NOAA Ship *Henry B. Bigelow***

**Commanding Officer:** CDR Jeff Taylor  
**Primary Mission Category:** Fisheries Research  
**DEPART:** Newport, RI **ARRIVE:** Newport, Rhode Island  
**DEPART:** Newport, RI **ARRIVE:** Newport, Rhode Island

**Project:** Autumn Bottom Trawl and Acoustic Survey

**Objectives:** Determine the autumn distribution and relative abundance of fish and invertebrate species found on the continental shelf and upper slope, including the collection of additional biological information following the pre-established sampling plan at the direction of the Chief Scientist. Opportunistically evaluate survey gear efficiency, methods, or survey related equipment that may benefit the trawl survey and fish stock assessments. Collect oceanographic data including conductivity, temperature, and depth casts and bongo tows at selected stations. Opportunistically collect acoustic data along cruise tracks with the EK-60 and ME-70 acoustic systems.

### **Davisville, RI**

#### **NOAA Ship *Okeanos Explorer***

**Commanding Officer:**

CAPT Mark Wetzler

**Primary Mission Category:**

Oceanographic Exploration and Research

**Ship Status:** Vessel will be in scheduled dry dock for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.

### **Norfolk, VA**

#### **NOAA Ship *Thomas Jefferson***

**Commanding Officer:**

CDR Christiaan van Westendorp

**Primary Mission Category:**

Hydrographic Surveys

**DEPART:** Norfolk, Virginia

**ARRIVE:** Savannah, Georgia

**DEPART:** Savannah, Georgia

**ARRIVE:** Charleston, South Carolina

**Project:** Approaches to Savannah

**Objective:** To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.



**NOAA Ship *Thomas Jefferson* prepares to leave the U.S. Coast Guard Shipyard in Baltimore, Maryland, after a successful yard period.**

Photo: [NOAA]

### **OMAO'S MARINE OPERATIONS CENTER – ATLANTIC (MOC-A)**

**CAPT Scott Sirois, Commanding Officer MOC-A**

MOC-A serves as a homeport for one NOAA ship, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the research and survey ships in NOAA's Atlantic fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.

## **Charleston, SC**

### **NOAA Ship *Nancy Foster***

**Commanding Officer:** Master Donn Pratt  
**Primary Mission Category:** Oceanographic Research, Environmental Assessment  
**Depart:** Charleston, South Carolina **Arrive:** Charleston, South Carolina  
**Depart:** Charleston, South Carolina **Arrive:** Morehead City, North Carolina

#### **Project:** VIRRS Ocean Color Calibration

**Objectives:** Observe and measure inherent and apparent optical properties of water masses for three primary objectives: JPSS VIIRS ocean color satellite validation; Inter-calibration and inter-comparison of validation techniques and measurements; and optical characterization of ocean variability.

#### **Project:** Benthic Habitat Characterization

**Objectives:** Collect high resolution multi-beam data in depths approximately 10 to 300 meters so as to continue to characterize seafloor habitats and cultural resources in support of the expansion of MNMS, including hard bottom seafloor habitats, shipwrecks, sand shoals and ridges, and validate seafloor habitat types and shipwrecks using drop cameras from small boats.

### **NOAA Ship *Ronald H. Brown***

**Commanding Officer:** CAPT Robert Kamphaus  
**Primary Mission Category:** Oceanographic Research, Environmental Assessment

**Ship Status:** At dry dock in Vallejo, California for scheduled maintenance, repairs, scientific data processing, crew rest, and training.

## **Pascagoula, MS**

### **NOAA Ship *Pisces***

**Commanding Officer:** CDR William Mowitt  
**Primary Mission Category:** Fisheries Research  
**DEPART:** Newport, Rhode Island **ARRIVE:** Newport, Rhode Island  
**DEPART:** Newport, Rhode Island **ARRIVE:** Boston, Massachusetts

#### **Project 1:** NERACOOS Mooring Maintenance

**Objectives:** Service of the UMOOS/NERACOOS Real-time data buoy array. The buoys currently deployed will be recovered and replaced with 5 buoys that will have been prepared at the University of Maine. UMaine will deploy an autonomous Slocum glider will be deployed in the Wilkinson Basin. The glider will be recovered as the ship returns to shore near the end of the project.

#### **Project 2:** Fall ECOMON

**Objectives:** Assess the hydrographic, planktonic and pelagic components of the Northeast U.S. Continental Shelf Ecosystem. Specifically we will quantify the spatial distribution of the following parameters: water currents, water properties, phytoplankton, microzooplankton, mesozooplankton, sea turtles and marine mammals.

### **NOAA Ship *Oregon II***

**Commanding Officer:**

Master Dave Nelson

**Primary Mission Category:**

Fisheries Research

**DEPART:** Pascagoula, Mississippi

**ARRIVE:** Galveston, Texas

**DEPART:** Galveston, Texas

**ARRIVE:** Pascagoula, Mississippi

**Project:** SEAMAP Fall Groundfish

**Objectives:** Sample the northern Gulf of Mexico (GOM) with Southeast Area Monitoring and Assessment Program (SEAMAP) standard trawl sampling gear to determine the abundance and distribution of benthic fauna.



**NOAA Ship *Oregon II* underway.**

[Photo: NOAA]

### **NOAA Ship *Gordon Gunter***

**Commanding Officer:**

LCDR Lindsay Kurelja

**Primary Mission Category:**

Fisheries Research

**DEPART:** Pascagoula, Mississippi

**ARRIVE:** Pascagoula, Mississippi

**Project:** Fall Pelagic Trawl/Acoustic Survey

**Objectives:** Sample the northern Gulf of Mexico with 90 ft high-opening fish trawl to determine the abundance and distribution of benthopelagic fauna species. The project will collect size measurements to determine population size structure, and collect biological samples of selected species.

### **San Diego, CA**

#### **NOAA Ship *Reuben Lasker***

**Commanding Officer:**

CDR Kurt Dreflak

**Primary Mission Category:**

Fisheries Research

**DEPART:** San Diego, California

**ARRIVE:** San Diego, California

**DEPART:** San Diego, California

**ARRIVE:** San Francisco, California

**Project:** Fall California Current Ecosystem Moorings

**Objectives:** Mooring replacement and recovery cruise for a California Current Ecosystem surface mooring, subsurface mooring, and Deep HARP mooring, with CTD casts for validation and calibration of mooring instrumentation.

**Project:** Seafloor Mapping of Coral Habitats

**Objectives:** Acquire high-resolution bathymetric data around the northern Channel Islands using the vessel's ME70 sonar. Survey rockfishes and habitats visually using autonomous underwater vehicle (AUV) During part of this cruise, *Reuben Lasker* will rendezvous with R/V *Velero IV* (contracted through NMFS) and use the AUV as part of an underwater experiment to observe and quantify the behavior of rockfishes in reaction to mobile survey vehicles (such as the AUV).

## **Newport, OR**

### **NOAA Ship *Rainier***

**Commanding Officer:**

CAPT E.J. van den Ameele

**Primary Mission Category:**

Hydrographic Surveys

**DEPART:** Kodiak, Alaska

**ARRIVE:** Kodiak, Alaska

**DEPART:** Kodiak, Alaska

**ARRIVE:** Kodiak, Alaska

**Project:** North Coast of Kodiak Island

**Objective:** To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.



***Rainier* skiff RA-8 heads off into the Kodiak Island sunrise to conduct investigations of charted (and uncharted) features along the shoreline.**

[Photo: NOAA]

### **NOAA Ship *Bell M. Shimada***

**Commanding Officer:**

CDR Paul Kunicki

**Primary Mission Category:**

Fisheries Research

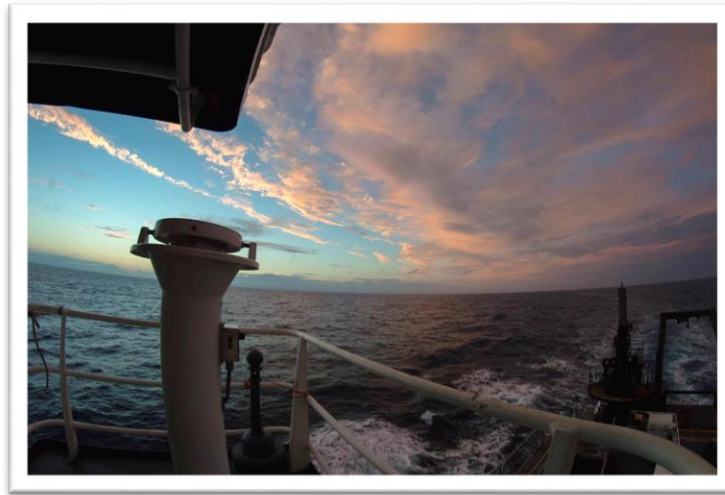
**DEPART:** San Diego, California

**ARRIVE:** Newport, Oregon

**Project:** Northern California Current

**Objectives:** Continue long-term studies of the Northern California Current (NCC) pelagic ecosystem and includes study of broad-scale patterns of hydrography, phytoplankton and zooplankton and ocean acidification/hypoxia in the NCC Large Marine Ecosystem off Oregon and Washington. Ecosystem studies were initiated in 1996, and studies of ocean acidification/hypoxia were initiated in 2010.





**NOAA Ship *Bell M. Shimada* underway from Aft Bridge Wing.**

[Photo: NOAA]

## **OMAO'S MARINE OPERATIONS**

### **CAPT Todd Bridgeman, Director of Marine Operations**

OMAO's Marine Operations over-sees operations of the three regional Centers, including the Marine Operations Center-Pacific, Marine Operations Center-Atlantic, and Marine Operations Center-Pacific Islands.

## **OMAO'S MARINE OPERATIONS CENTER – PACIFIC (MOC-P)**

### **CDR Brian Parker, Commanding Officer MOC-P**

MOC-P serves as a homeport for two NOAA ships, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the research and survey ships in NOAA's Pacific fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.

### ***Ketchikan, AK***

#### **NOAA Ship *Fairweather***

##### **Commanding Officer:**

CDR Mark Van Waes

##### **Primary Mission Category:**

Hydrographic Surveys

**DEPART:** Seward, Alaska

**ARRIVE:** Ketchikan, Alaska

**DEPART:** Ketchikan, Alaska

**ARRIVE:** Ketchikan, Alaska

**Project:** Southeast Alaska

**Objective:** To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

### ***Kodiak, AK***

#### **NOAA Ship *Oscar Dyson***

##### **Commanding Officer:**

CDR Michael Levine

##### **Primary Mission Category:**

Fisheries Research

**DEPART:** Dutch Harbor, Alaska

**ARRIVE:** Dutch Harbor, Alaska

**DEPART:** Dutch Harbor, Alaska

**ARRIVE:** Dutch Harbor, Alaska

**Project 1:** FOCI Bearing Sea



**Objective:** This research area is focused on improving and reducing uncertainty in stock assessment models of important commercial fish species in the Bering Sea through the collection of acoustics information, fish and zooplankton samples, and fisheries oceanographic indices.



**NOAA Ship Oscar Dyson underway with an autonomous Saildrone.**

[Photo: LT Frydrych/NOAA]

### **Honolulu, HI**

#### **NOAA Ship Hi'ialakai**

**Commanding Officer:**

CAPT Elizabeth Kretovic

**Primary Mission Category:**

Oceanographic Research, Environmental Assessment

**DEPART:** Pearl Harbor, Hawaii

**ARRIVE:** TBD

**Ship Status:** Dry Dock & Winter Repair Period. Vessel will be in scheduled dry dock for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.

#### **NOAA Ship Oscar Elton Sette**

**Commanding Officer:**

CDR Donald Beaucage

**Primary Mission Category:**

Fisheries Research

**DEPART:** Pearl Harbor, Hawaii

**ARRIVE:** Pearl Harbor, Hawaii

**Project:** Insular Bottomfish Survey

**Objectives:** Support the first operational survey of Deep-7 bottomfish stock across the Main Hawaiian Islands using the Modular Optical Underwater Survey System (MOUSS) fishery-independent sampling gear. The MOUSS builds and improves upon previous efforts with the Baited Stereo-Video Bottom Camera System (BotCam), which has been effectively used to collect fishery-independent species-specific size-structured abundance data on bottomfish in the Main Hawaiian Islands.

### **OMAO'S MARINE OPERATIONS CENTER – PACIFIC ISLANDS (MOC-PI)**

**CDR Matthew Wingate, Commanding Officer MOC-PI**

MOC-PI serves as a homeport for two NOAA ships, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the ships in NOAA's Pacific Islands' fleet.



# OMAO's Aircraft



## *Tampa, Florida*

### **WP-3D (N42RF) – “Hurricane Hunter”**

**Temporary Base:**

Naval Air Station Jacksonville, FL

**Current Mission:**

Scheduled Maintenance - Until Mid-October 2016

The aircraft is at the Naval Air Station Jacksonville undergoing an extensive refurbishment period which will include replacing the wings and upgrading various components. This effort will extend the useful life of the aircraft for another 15-20 years. Following completion, aircraft will be configured for survey operations.

### **WP-3D (N43RF) – “Hurricane Hunter”**

**Current Mission:**

2016 Hurricane Season - June through November 2016

The NOAA WP-3D Hurricane Hunter aircraft is ready to respond. Radar reconnaissance missions on the NOAA WP-3D aircraft will be conducted to support tropical cyclone forecasting and the Hurricane Forecast Improvement Project. These flights will use the WP-3D's tail Doppler radar system to obtain high-density, three-dimensional measurements of the inner core wind structure of each tropical cyclone, potentially throughout its full life cycle. The hurricane research missions will also use the WP-3D to support the calibration/validation of satellite measurements and instrumentation development for the tropical cyclone environment and sampling of other aspects of the tropical cyclone inner core. These measurements will be used to enhance the accuracy of track and intensity guidance generated by NOAA's numerical weather prediction models. They will also be used directly by NOAA's National Weather Service hurricane specialists with the ultimate outcome being improved accuracy of intensity and track forecasts, extended forecast/warning lead-times and improved confidence levels by decision makers.

### **Jet Prop Commander (N45RF)**

**Temporary Base:**

Various locations

**Current Mission:**

Soil Moisture Surveys

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of soil moisture content across the country. This information is critical for managers and others to make optimal decisions supporting river, flood, and water supply forecasting, agriculture and forest management, recreation and winter tourism, and the commerce, industry, and transportation sectors of the Nation's economy. The benefits of accurate soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

### **Gulfstream IV (N49RF)**

**Current Mission:**

2016 Hurricane Season - June through November 2016

NOAA's Gulfstream IV aircraft will support operational tropical cyclone forecasting and the Hurricane Forecast Improvement Project. The G-IV will be the primary aircraft for surveillance missions with the Air Force's WC-130J and NOAA's WP-3D aircraft serving as backup platforms. The radar reconnaissance missions will use the G-IV's Tail Doppler Radar (TDR) system to obtain high-density, three-dimensional measurements of the inner core wind structure of tropical cyclones, potentially throughout its full life cycle. NOAA's National Weather Service is seeking to gather data on the performance of the TDR observation system and will work with the Hurricane Research Division to develop observing strategies for maximizing the utility of the TDR with the goal of improving hurricane track and intensity forecasts.

### **Twin Otter (N46RF)**

**Temporary Base:** Northeast U.S. Coast

**Current Mission:** Soil Moisture Survey

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of soil moisture content across the country. This information is critical for managers and others to make optimal decisions supporting river, flood, and water supply forecasting, agriculture and forest management, recreation and winter tourism, and the commerce, industry, and transportation sectors of the Nation's economy. The benefits of accurate soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

### **King Air (N68RF)**

**Temporary Base:** Various locations

**Current Mission:** Continuous Coastal Mapping

Coastal Mapping is an on-going mission of NOAA's National Geodetic Survey (NGS) to survey approximately 95,000 miles of United States coastline providing the Nation with an accurate, up-to-date and seamless database of the national shoreline. This data is used as the baseline for defining America's marine territorial limits, including its Exclusive Economic Zone, and for the geographic reference needed to manage coastal resources and support marine navigation. Stereo photogrammetry and LiDAR are used to produce a digital database. In addition, the Coastal Mapping Program supports NOAA's homeland security and emergency response requirements by rapidly acquiring and disseminating a variety of datasets to federal, state, and local government agencies as well as the general public.

### **Twin Otter (N48RF)**

**Temporary base:** Various locations

**Current Mission:** Coastal Mapping LiDAR

The TopoBathy Lidar mission will collect data in the coastal zone used to produce the most up-to-date and accurate marine navigation charts, FEMA flood plain and inundation maps, and other Integrated Ocean and Coastal Mapping (IOCM) applications. Data gathered will help ensure safe and efficient marine transportation and benefit coastal communities with accurate resource management and aid emergency response efforts.

### **Twin Otter (N56RF)**

**Current Mission:** Scheduled Maintenance

The aircraft will be in scheduled maintenance through the end of January.

### **Twin Otter (N57RF)**

**Temporary base:** Monterey, California

**Current Mission:** West Coast Sea Turtles followed by Northeast AMAPPS through mid-November.

The NMFS West Coast Sea Turtles survey will determine density and abundance of endangered Pacific leatherback and loggerhead in West Coast waters. Data on oceanographic conditions will be collected concurrently. The goal is to collect long-term data that can be used to build models to predict occurrence of protected species as a function of environmental variables. Capture and sampling of free-swimming leatherbacks will also be conducted by an in-water team, with assistance from the aerial survey observers.

The aircraft will be supporting the NMFS Atlantic Marine Assessment Program for Protected Species (AMAPPS) project on the northeast coast of the US. This survey helps to develop models and tools to provide seasonal density estimates incorporating habitat characteristics of marine mammals, turtles, and seabirds in the western North Atlantic Ocean. The project will provide data essential to supporting conservation initiatives mandated under the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), Migratory Bird Treaty Act (MBTA), and Endangered Species Act (ESA).

## **OMAO'S AIRCRAFT OPERATIONS CENTER (AOC)**

### **CAPT Michael Silah, Commanding Officer AOC**

The AOC, located at MacDill Air Force Base in Tampa, Florida, serves as the main base for OMAO's fleet of nine aircraft and provides capable, mission-ready aircraft and professional crews to the scientific community. Whether studying global climate change or acid rain, assessing marine mammal populations, surveying coastal erosion, investigating oil spills, flight checking aeronautical charts, or improving hurricane prediction models, the AOC flight crews continue to operate in some of the world's most demanding flight regimes.



**NOAA's G-IV flies over Tropical Storm Carl.**

[Photo: LT David Cowan/NOAA]



# Unmanned Systems Support



## *NASA Global Hawk*

**Location:** NASA Wallops Flight facility

**Mission:** SHOUT (Sensing Hazards Operationally using Unmanned Technology)

The NASA Global Hawk N872NA completed the September portion of the SHOUT (Sensing Hazards Operationally using Unmanned Technology) campaign having conducted flights into TD8 and TD9 in late August and TS Gaston, TS Hermine, and TS Karl all during the month of September. With an increase in storms flown this year it should provide the comparisons needed to ingest the Global Hawk dropsonde data into the national models and provide for follow-on work in future seasons. Upon arrival at NASA Armstrong Flight Research Center at Edwards AFB the removal of SHOUT instrumentation will occur and N872NA will be refitted and tested with instruments for additional NASA mission tasking to be conducted in late Summer and Fall of 2017.

## *APH-22 Hexacopter*

**Location:** Cape Shirreff, Antarctica

**Mission:** SWFSC Field Operations

The Southwest Fisheries Science Center (SWFSC) is collaborating with the Antarctic Ecosystem Research Division (AERD) to utilize the APH-22 hexacopter to measure wildlife response to UAVs. A multi- species comparative approach will be used. Targets for these studies will include several seal species (Antarctic fur, elephant, and leopard seals) and two penguin species (chinstrap and gentoo penguins). These missions will consist of repeated flights at a set of controlled altitudes to quantify behavioral responses of overflights on wild animal populations during breeding and non-breeding periods. In addition, a study to define the relationship between mass, size and shape as determined from vertical aerial photographs for pinnipeds will be continued. This later goal is especially important because the other alternative to obtaining mass data is to drug and capture the animals, which can be dangerous for both the scientist and the animals studied. Finally, colony-wide census flights will be conducted to monitor penguin chick production.

**Location:** Atlantic Northeast, Cape Cod vicinity

**Mission:** Atlantic Menhaden

The North East Fisheries Science Center is collaborating with the South East Fisheries Science Center and University of New Hampshire to develop aerial and underwater acoustical methods that will improve fisheries-independent estimates of Atlantic Menhaden abundance and biomass on the East Coast. The project is being funded through NOAA Fisheries Office of Science and Technology. Operations will consist of launching and deploying an APH-22 from the small boat F/V Lily.

**Location:** Atlantic Northeast

**Mission:** Emergency Response Turtles, and Seals

The North East Fisheries Science Center (NEFSC) seeks to use the APH-22 hexacopter to respond to entanglements and other unplanned situations involving marine mammals. Photographs will be collected for the purpose of aiding emergency stranding response, event documentation, and photo ID. UAS technologies will also be used to conduct surveys for marine turtles. The intent is to assess the feasibility of using small unmanned rotorcraft to search for turtles in their marine environment both at surface and subsurface. Turtles that are discovered either by the APH-22 or by on-vessel observers will be photographed by the APH-22 and then tagged and or sampled as part of an ongoing study. Turtles may be photographed post-release with the APH-22 to document post-release behavior. NEFSC will also use the APH-22 to conduct surveys of seal haulout sites. Photographs will be collected for the purpose of obtaining local population numbers, documenting seals with evidence of fishery interactions, and collecting photo ID data of seals with brands, wounds, and other distinguishing marks.

### ***MD4-1000/DJI S-1000***

**Location:** Knoxville, Tennessee

**Mission:** MD4-1000 Evaluation

NOAA's Air Resources Laboratory, Atmospheric Turbulence and Diffusion Division seeks to utilize the NOAA National Marine Fisheries Center for Cooperative Unmanned Technologies MD4-1000 and DJI S-1000 airframes to perform instrument testing to verify its performance prior to the upcoming VORTEX-SE 2017 field study. Two iMet-XQ temperature/pressure/relative humidity sensors will be flown on the MD4-1000 for inter-comparison with the existing DJI S-1000 platform.

### ***SenseFly eBee RTK***

**Location:** Corbin, Virginia – Duck, North Carolina

**Mission:** Training and Operational Development

The Remote Sensing Division (RSD) and the Office of National Marine Sanctuaries (ONMS) have been funded to operate the SenseFly eBee RTK to further the development of UAS operational procedures specifically related to coastal and habitat mapping, living marine resource surveys, as well as a range of emergency preparation, response and recovery requirements. The project consists of the initial acquisition, flight training and system acceptance. Upon completion of the training/system acceptance segment several operational missions will take place during the fall to begin the development of procedures and protocols for integrating eBee operations and data collection into existing RSD and ONMS programs.

### ***SenseFly eBee RTK/MicroDrones MD4-1000***

**Location:** Camarillo, CA

**Mission:** Training and Operational Development

The Collaborative Center for Unmanned Technologies (CCUT) in partnership with the Remote Sensing Division (RSD) require a west coast training and testing field to operate the microdrones md4-1000 and senseFly eBee in order to maintain operator currency and proficiency and provide a controlled environment for refining data collection protocols and procedures. California State University Channel Islands (CSUCI) and CCUT have recently signed an MOA to partner on the use of UAS for research and monitoring at the Channel Islands and have agreed to provide access to their training field and support facilities.





# OMAO Partnerships



## ***United States Senate Committee on Commerce, Science, and Transportation***

**Location:** Washington, DC

**Detail:** LCDR Wendy Lewis, NOAA Commissioned Officer Corps

LCDR Lewis is currently on detail to the Committee with the staff of the Chair, Senator John Thune (R-SD), where she is assisting on activities pertaining to oceans, atmosphere, and fisheries policy, as well as other matters within the Committee's jurisdiction.

## ***National Science Foundation***

**Location:** Antarctica

**Mission:** LT Rafael Klein, NOAA Commissioned Officer Corps

Members of the NOAA Commissioned Officer Corps carry out NOAA's mission in remote locations across the globe.

LTJG Klein is assigned to Antarctica where he serves as the Station Chief for NOAA's Atmospheric Research Observatory (ARO) at the Amundsen-Scott South Pole Station. The ARO at the Amundsen-Scott South Pole Station is a National Science Foundation facility used in support of scientific research related to atmospheric phenomena.

## ***Department of Defense - U.S. Pacific Command (USPACOM)***

**Location:** Honolulu, Hawaii

**Embedded Liaison:** CAPT Barry Choy, NOAA Commissioned Officer Corps

The U.S. Pacific Command (USPACOM) area of responsibility encompasses approximately half the earth's surface and more than half of its population. The 36 nations that comprise the Asia-Pacific include: two of the three largest economies and nine of the ten smallest; the most populous nation; the largest democracy; the largest Muslim-majority nation; and the smallest republic in the world. The region is a vital driver of the global economy and includes the world's busiest international sea lanes and nine of the ten largest ports. By any meaningful measure, the Asia-Pacific is also the most militarized region in the world, with seven of the world's ten largest standing militaries and five of the world's declared nuclear nations. Under these circumstances, the strategic complexity facing the region is unique. CAPT Choy is linked closely with the activities within the region allowing for identification of opportunities and cooperation between USPACOM and NOAA, and better overall government function situational awareness in the region.

## ***Department of Defense - U.S. Navy***

**Location:** Washington, DC

**Embedded Liaison:** LCDR Jason Mansour, NOAA Commissioned Officer Corps

LCDR Jason Mansour serves as NOAA liaison to the Oceanographer of the Navy and is an important interface between the U.S. Navy and other U.S. federal agencies, including NOAA. As NOAA Liaison, LCDR Jason Mansour serves as the Head of the Interagency Policy Branch of the International and Interagency Policy Division, Office of the Oceanographer of the Navy, located at the U.S. Naval Observatory. The mission of this Division is to coordinate and execute the Oceanographer of the Navy functions related to policy and programs involving international and/or interagency oceanography. Oceanography includes meteorology, oceanography, mapping, charting and geodesy, astronomy, and precise time and time interval.

**Location:** Stennis Space Center, Mississippi

**Embedded Liaison:** LTJG Laura Dwyer, NOAA Commissioned Officer Corps

Embedded in the Navy's Naval Oceanography Mine Warfare Center, LTJG Laura Dwyer works side by side with Navy officers operating Unmanned Underwater Vehicles worldwide and is currently stationed at Stennis Space Center. This collaboration will provide knowledge and experience that will keep NOAA on the cutting edge of this emerging technology as well as strengthen the partnership between NOAA and the Navy.

### ***Department of Homeland Security - U.S. Coast Guard***

**Location:** Washington, DC

**Embedded Liaison:** CDR G. Mark Miller, NOAA Commissioned Officer Corps

As the NOAA liaison to the United States Coast Guard (USCG), CDR Miller maintains a current and comprehensive knowledge of interagency activities and policies related to the USCG and NOAA. He identifies potential conflicts or benefits issues for analysis and evaluation, conducts appropriate assessments and studies, and serves as the interface between NOAA and the USCG. CDR Miller initiates, designs, and implements strategies through federal agency liaison and coordination that results in cooperative arrangements for maritime security, oceanographic research, hazardous materials spill response, and many other activities.



# Teacher at Sea Program



The mission of the [Teacher at Sea](#) (TAS) program is to give teachers a clearer insight into our ocean planet, a greater understanding of maritime work and studies, and to increase their level of environmental literacy by fostering an interdisciplinary research experience. The program provides a unique environment for learning and teaching by sending kindergarten through college-level teachers to sea aboard NOAA research and survey ships to work under the tutelage of scientists and crew. Then, armed with new understanding and experience, teachers bring this knowledge back to their classrooms. Since its inception in 1990, the program has enabled more than 600 teachers to gain first-hand experience of science and life at sea. By participating in this program, teachers enrich their classroom curricula with knowledge that can only be gained by living and working side-by-side, day and night, with those who contribute to the world's body of oceanic and atmospheric scientific knowledge. Below is a list of the NOAA Teachers at Sea for the current monthly update for the 2016 Field Season. Once they have embarked on their cruise, you can gain access to their [blogs](#) which document their missions at sea and offer a wealth of information about the research being conducted as well as personal stories.

- Teacher In FY 16 NOAA's Teacher at Sea Program sent 13 teachers to sea, and supported 36 Teacher at Sea Events.
- Advertising for FY17 Teacher at Sea season is open; online application available from November 1-30.
  - NOAA Teacher at Sea Facebook reach for online application is 56,000+ and 320+ shares.





# OMAO - NOAA Dive Program



OMAO manages and implements [NOAA's Dive Program](#) (NDP), which trains and certifies scientists, engineers, and technicians from federal, state, tribal governments, and the private sector to perform the variety of tasks carried out underwater to support NOAA's mission. NDP also has cooperative diving agreements with over 100 government agencies and academic institutions. NOAA has more than 400 divers who perform over 14,000 dives per year. The NDP is headquartered at the NOAA Diving Center at the NOAA Western Regional Center in Seattle, Washington.



**Children greet NOAA Diver Lt. Cmdr. Nicola VerPlanck from a window in the training tower.**

[Photo: Aitana de la Jara/NOAA]



# OMAO Small Boat Program



OMAO manages NOAA's [Small Boat Program](#) and sets policy and provides safety inspections for almost 400 small boats operated by the various Line and program offices throughout NOAA, which support fisheries laboratories, dive support, nautical charting, ocean and Great Lakes research, and more.



**NOAA small boats support many diverse operations across the country.**

[Photos: NOAA]





# Office of Marine and Aviation Operations



*Providing Environmental Intelligence for a Dynamic World*

The personnel, ships, and aircraft of NOAA play a critical role in gathering environmental data vital to the nation's economic security, the safety of its citizens, and the understanding, protection, and management of our natural resources. The NOAA fleet of ships and aircraft is managed and operated by the Office of Marine and Aviation Operations (OMAO), an office comprising civilians, mariners, and officers of the NOAA Commissioned Officer Corps, one of the seven uniformed services of the United States. NOAA's roots trace back to 1807, when President Thomas Jefferson ordered the first comprehensive coastal surveys. Those early surveys ensured safe passage of ship-borne cargo for a young nation. As the needs of the nation have grown, so too have OMAO's responsibilities. Today, OMAO civilians and NOAA Corps officers operate, manage, and maintain NOAA's active fleet of 16 research and survey ships and nine specialized aircraft. Together, OMAO and the NOAA Corps support nearly all of NOAA's missions.



NOAA has the largest fleet of federal research and survey ships in the nation. The fleet ranges from large oceanographic ships capable of exploring and charting the world's deepest ocean, to smaller vessels responsible for surveying the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities including fisheries surveys, nautical charting, and ocean and climate studies. Based throughout the continental United States, Alaska, and Hawaii, the ships operate in all regions of the nation and around the world.

NOAA's aircraft provide a wide range of airborne capabilities. Our highly specialized Lockheed WP-3D "Hurricane Hunter" aircraft are equipped with an unprecedented variety of scientific instrumentation, radars, and recording systems for both in situ and remote sensing measurements of the atmosphere, the Earth, and its environment. Equipped with both C-band weather radar and X-band tail Doppler radar systems, the WP-3Ds have the unique ability to conduct tropical cyclone research in addition to storm reconnaissance. Together with NOAA's Gulfstream IV-SP hurricane surveillance jet, these aircraft greatly improve our physical understanding of hurricanes and enhance the accuracy of tropical cyclone forecasts. NOAA's light aircraft also play a vital role in monitoring our environment. Our King Air, Commander and Twin Otter aircraft support marine mammal population studies, shoreline change assessments, oil spill investigations, and water resource/snowpack surveys for spring flood forecasts.





The NOAA fleet provides immediate response capabilities for unpredictable events. For example, in November 2014, our aircraft flew missions over upstate New York after the record snow falls of up to seven feet and conducted airborne Snow Water Equivalent (SWE) and soil moisture measurements. Airborne SWE measurements are used by NOAA's National Weather Service when issuing river and flood forecasts, water supply forecasts, and spring flood outlooks.

After Hurricane Sandy in 2012, NOAA ships Thomas Jefferson and Ferdinand R. Hassler conducted emergency bathymetric surveys to locate possible submerged navigational hazards in the ports of New York and Virginia. These surveys enabled the ports to reopen quickly. Aerial images of storm-stricken regions, taken by NOAA aircraft, helped residents and emergency workers to quickly assess the condition of houses, bridges, and vital infrastructure. In 2010, the NOAA fleet and the NOAA Corps played a major role in the response to the BP Deepwater Horizon oil spill. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf following the spill, developing mission plans and assisting response efforts.

While manned aircraft and sea-going vessels have been, and will continue to be, a primary source of environmental data, new technology will have a significant role to play in the future NOAA fleet. OMAO, in coordination with other NOAA offices and federal agencies, is evaluating and deploying remotely piloted underwater and aircraft systems that could significantly contribute to environmental observations. OMAO's ongoing challenge is to meet the growing demand for in situ scientific data while providing the highest level of service. To better serve the needs of the nation, NOAA is examining the composition of the fleet through an exhaustive and critical review of at-sea science and observation requirements. Our objective is to develop a clear, cost-efficient path forward to ensure that the NOAA fleet can continue to conduct at-sea surveys and research vital to fisheries management, updating nautical charts, responding to natural and manmade disasters, and understanding coastal and marine systems more fully. Meeting these requirements is essential to developing sustainable, science-based management and conservation plans that protect the health and resiliency of these resources over the long-term.

We continue our efforts to build a civilian and NOAA Corps officer work force that is uniquely qualified to gather critical environmental intelligence and be adaptive and responsive to a changing world and work to expand our partnerships with other federal agencies. For example, NOAA Corps officers are currently assigned to work in the Department of Defense, National Science Foundation, and the U.S. Senate among others where they lend their expertise and service. We also continue to strengthen our partnership with the U.S. Coast Guard. Our basic NOAA Corps officer training class is held at the U.S. Coast Guard Academy, where newly commissioned officers train alongside Coast Guard officer candidates, developing skills and professional relationships that will benefit both services, especially during challenging times. Active collaboration among the Federal family is critical to ensuring the long-term capability and success of the federal ocean infrastructure. Our partners' success is our success. The men and women of OMAO and the NOAA Corps provide environmental intelligence for a dynamic world as they serve our nation every day from the farthest seas to the highest skies.

# NOAA Commissioned Officer Corps

– Honor, Respect, Commitment –



The NOAA Commissioned Officer Corps (NOAA Corps) is one of the United States' seven Uniformed Services and as commissioned officers serve with the 'special trust and confidence' of the President. NOAA Corps officers are an integral part of the National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce. With an authorized strength of 321 officers, the NOAA Corps serves throughout the agency's Line and Staff Offices to support nearly all of NOAA's programs and missions. The combination of commissioned service and scientific expertise makes these officers uniquely capable of leading some of NOAA's most important initiatives.

The NOAA Corps is part of NOAA's Office of Marine and Aviation Operations (OMAO) and traces its roots back to the former U.S. Coast and Geodetic Survey, which dates back to 1807 and President Thomas Jefferson. In 1970, NOAA was created to develop a coordinated approach to oceanographic and atmospheric research and subsequent legislation converted the commissioned officer corps to the NOAA Corps. The NOAA Corps today provides a cadre of professionals trained in engineering, earth sciences, oceanography, meteorology, fisheries science, and other related disciplines. Corps officers operate NOAA's ships, fly aircraft, manage research projects, conduct diving operations, and serve in staff positions throughout NOAA.

## Benefits of the NOAA Corps to the Nation

The combination of commissioned service with scientific and operational expertise, allows the NOAA Corps to provide a unique and indispensable service to the nation. Discipline and flexibility are inherent in the NOAA Corps personnel system. Officers are trained for positions of leadership and command in the operation of ships and aircraft; in the conduct of field projects on land, at and under the sea, and in the air; in the management of NOAA observational and support facilities; as members or leaders of research efforts; and in the management of various organizational elements throughout NOAA. NOAA Corps officers must be technically competent to assume positions of leadership and command in NOAA and Department of Commerce programs and in the Armed Forces during times of war or national emergency. NOAA Corps officers enable NOAA to fulfill mission requirements, meet changing environmental concerns, take advantage of emerging technologies, and serve as environmental first responders.

- In 2015, NOAA aircraft conducted research and surveillance missions into some of the planet's most extreme weather, ranging from Hurricane Patricia, the strongest on record in the Western hemisphere, to severe storms over the U.S. Great Plains region. In addition, NOAA aircraft responded to unprecedented flooding in South Carolina using advanced sensors and imaging technology to provide emergency response managers with critical real-time information needed to respond to this disaster.
- In 2015, several ships conducted monitoring of an extensive harmful algal bloom (HAB) extending from California to the Gulf of Alaska. The 2015 HAB was the largest in more than a decade, affecting sea birds, sea lions, and triggered closures of commercial shellfish fisheries along the U.S. west coast. Observations help scientists understand HABs and help predictive modeling for the future.
- After Hurricane Sandy in 2012, NOAA Ships *Thomas Jefferson* and *Ferdinand R. Hassler* conducted emergency bathymetric surveys to locate possible submerged navigational hazards in the ports of New York and Virginia. These surveys enabled the ports to reopen quickly. Aerial images of storm-stricken regions, taken by NOAA aircraft, helped residents and emergency workers to quickly assess the condition of houses, bridges, and vital infrastructure.
- After Hurricane Irene in 2011, the NOAA Ship *Ferdinand Hassler* and team completed 300 lineal nautical miles of survey work in less than 48 hours providing a damage assessment that enabled the U.S. Coast Guard to reopen ports and restore more than \$5M per hour in maritime commerce less than three days after the storm.
- In 2010, the NOAA fleet and the NOAA Corps played a major role in the response to the BP Deepwater Horizon oil spill in the Gulf of Mexico. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf following the spill, developing mission plans and assisting response efforts.